

Total No. of Questions : 4]

SEAT No. :

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[6188]-164

B.E. (Mechanical) (Insem.)

OPERATION RESEARCH

(2019 Pattern) (Semester - VII) (Elective - IV) (402045D)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Answer Q1 or Q2 and Q3 or Q4.
- 2) Answers in one answer books.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

Q1) a) Discuss Scientific methodology in Operation Research. [5]

b) A food products company is contemplating the introduction of a revolutionary new product with new packaging or replacing the existing product at much higher price (S1). It may even make a moderate change in the composition of the existing product, with a new packaging at a small increase in price (S2), or may a small change in the composition of the existing product, backing it with the word "New" and a negligible increase in price (S3). The three different possible states of nature or events are high increase in sales (N1), no change in sale (N2) and decrease in sale (N3). The marketing department of the company worked out the payoff's in terms of the yearly net profits for each of the strategies of three events. This is represented in the following table. Which strategy should be concerned executive choose on the basis of [10]

- i) Maxi-min criteria
- ii) Maxi-max criteria
- iii) Mini-max criteria
- iv) Laplace criteria

Strategies	States of nature		
	N1	N2	N3
S1	7,00,000	3,00,000	1,50,000
S2	5,00,000	4,50,000	0
S3	3,00,000	3,00,000	3,00,000

P.T.O.

OR

- Q2) a)** Discuss different types of Decision making environments. [5]  
**b)** Solve the game whose payoff matrix is given below: [10]

Player B

		B1	B2	B3	B4
Player A	A1	3	2	4	0
	A2	3	4	2	4
	A3	4	2	4	0
	A4	0	4	0	8

- Q3) a)** Six jobs are to be process on three machines. The processing time is as follows, Find the optimal schedule so that the total elapsed time is minimized. [12]

Job	J1	J2	J3	J4	J5	J6
Machine M1 [Turning]	10	3	5	4	2	1
Machine M2 [Threading]	2	4	6	3	1	2
Machine M3 [Knurling]	8	6	7	9	7	7

- b)** Explain Kendall's notation for representing queuing models? [3]

OR

- Q4) a)** A repair shop attended by a single mechanic has an average of four customers an hour who bring small appliances for repair. The mechanic inspects them for defects and takes six minutes an average. Arrivals are Poisson and service rate has the exponential distribution. [8]

You are required to

- Find the proportion of time during which there is no customer in the shop.
- Find the probability of finding at least one customer in the shop.
- What is the average number of customers in the system?
- Find the average time spent by a customer in the shop including service.

- b) A book binder has one printing press, one binding machine and manuscripts of 7 different books. The times required for performing printing and binding operations for different books are shown below : [7]

Book	1	2	3	4	5	6	7
Printing Press (Hours)	20	90	80	20	120	15	65
Binding time (Hours)	25	60	75	30	90	35	50

Decide the optimum sequence of processing book in order to minimize the total time required to bring out all the books.

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